

IN THE CLAIMS:

This listing of the claim will replace all prior versions and listings of claim in the present application.

Listing of Claims

1. (previously presented) A transmission apparatus, of orthogonal frequency division multiplexing for multiplexing a plurality of carriers orthogonal to one another for transmitting signals having a transmission band, including a transmission side and a reception side, said transmission side comprising:

- an input terminal to which said signals are applied;
- a first modulator coupled with said input terminal for outputting first signals which are main information code signals modulated in accordance with a first modulation scheme;
- a second modulator for outputting second signals which are auxiliary signals modulated in accordance with a second modulation scheme; and
- a transmission unit including a distributing circuit coupled with said first and second modulators, said distributing circuit distributing said first and second signals modulated by said first and second modulators to a plurality of predetermined carriers, respectively, so that said second signals are arranged at the positions of all or some of said plurality of predetermined carriers existing within a limited number of carriers close to at least one of both lower and upper ends of said transmission band, and said first signals are arranged at the positions of all or some of the remaining carriers other than said limited number of carriers of said transmission band, and outputting the modulated signals.

2. (previously presented) An apparatus according to claim 1, wherein said second signals are arranged at the positions of all or some of said plurality of carriers existing within a predetermined number of carriers from said respective ends on the lower frequency side and on the higher frequency side of said transmission band.

3. (currently amended) A transmission apparatus, of orthogonal frequency division multiplexing for multiplexing a plurality of carriers orthogonal to one another for transmitting signals, having a transmission band including a transmission side and a reception side, said transmission side comprising:

an input terminal to which said signals are applied;

a first modulator coupled with said input terminal for outputting first signals which are main information code signals modulated in accordance with a first modulation scheme;

a second modulator for outputting second signals which are auxiliary signals modulated in accordance with a second modulation scheme; and

a transmission unit including a distributing circuit coupled with said first and second modulators for distributing said first and second signals modulated by said first and second modulators to a plurality of predetermined carriers, respectively, so that said second signals are arranged at the positions of all or some of said plurality of predetermined carriers existing within a limited number of carriers close to at least one of both lower and upper ends of said transmission band, and said first signals are arranged at

the positions of all or some of the remaining carriers other than said limited number of carriers of said transmission band, and outputting the modulated signals, τ

wherein said second modulator further outputs pilot signals and said plurality of carriers distributed with said second signals modulated by said second modulator are some or all of carriers except for carriers used for reproducing reference signal vectors in accordance with said pilot signals for use in demodulating said first signals of carriers modulated in accordance with said first modulation scheme.

4. (previously presented) An apparatus according to claim 3, wherein said second modulation scheme in said second modulator is a differential modulation scheme.

5. (previously presented) An apparatus according to claim 3, wherein said second modulation scheme in said second modulator is a modulation scheme having a smaller number of multilevels than a number of multilevels in said first modulation scheme.

6. (previously presented) An apparatus according to claim 5, wherein said second modulation scheme in said second modulator is one of QPSK, 16QAM and 32QAM schemes.

7. (previously presented) A transmission apparatus of orthogonal frequency division multiplexing for transmitting signals having a transmission band, said transmission apparatus comprising:

- a first error correction coding circuit for converting a first code to a first error correction code;
- a second error correction coding circuit for converting a second code to a second error correction code which has error correcting performance higher than said first error correction code;
- a first modulator for outputting first signals which are main information code signals modulated with said first error correction code in accordance with a first modulation scheme;
- a second modulator for outputting second signals which are auxiliary signals modulated with said second error correction code in accordance with a second modulation scheme; and
- a distributing circuit for distributing said first and second signals modulated by said first and second modulators to a plurality of predetermined carriers, respectively, so that said second signals are arranged at the positions of all or some of said plurality of predetermined carriers existing within a limited number of carriers close to at least one of both lower and upper ends of said transmission band, and said first signals are arranged at the positions of all or some of the remaining carriers other than said limited number of carriers of said transmission band.

8. (previously presented) An apparatus according to claim 7, wherein said second signals are arranged at the positions of all or some of

said plurality of carriers existing within a predetermined number of carriers from said respective ends on the lower frequency side and on the higher frequency side of said transmission band.

9. (currently amended) A transmission apparatus of orthogonal frequency division multiplexing for transmitting signals having a transmission band, said transmission apparatus comprising;

a first error correction coding circuit for converting a first code to a first error correction code;

a second error correction coding circuit for converting a second code to a second error correction code which has error correcting performance higher than said first error correction code;

a first modulator for outputting first signals which are main information code signals modulated with said first error correction code in accordance with a first modulation scheme;

a second modulator for outputting second signals which are auxiliary signals modulated with said second error correction code in accordance with a second modulation scheme; and

a distributing circuit for distributing said first and second signals modulated by said first and second modulators, to a plurality of predetermined carriers, respectively, so that said second signals are arranged at the positions of all or some of said plurality of predetermined carriers existing within a limited number of carriers close to at least one of both lower and upper ends of said transmission band, and said first signals are arranged at

the positions of all or some of the remaining carriers other than said limited number of carriers of said transmission band,

wherein said second modulator further outputs pilot signals and said plurality of carriers distributed to said second signals modulated by said second modulator are some or all of carriers except for carriers used for reproducing reference signal vectors in accordance with said pilot signals for use in demodulating said first signals of carriers modulated in accordance with said first modulation scheme.

10. (previously presented) An apparatus according to claim 9, wherein said second error correction code is a $1/2$ convolutional code when said first error correction code is a $3/4$ convolutional code.

11. (previously presented) A transmission/reception system, of orthogonal frequency division multiplexing, having a transmitter for transmitting signals having a transmission band and a receiver for receiving and demodulating said signals,

wherein said transmitter comprises:

a first modulator for outputting first signals which are main information code signals modulated in accordance with a first modulation scheme;

a second modulator for outputting second signals which are auxiliary signals modulated in accordance with a second modulation scheme; and

a distributing circuit for distributing said first and second signals modulated by said first and second modulator to a plurality of predetermined carriers, respectively, so that said second signals are arranged at the

positions of all or some of carriers existing within a limited number of carriers close to at least one of both lower and upper ends of said transmission band, and said first signals are arranged at the positions of all or some of the remaining carriers other than said limited number of carriers of said transmission band.

12. (previously presented) A transmission/reception system, of orthogonal frequency division multiplexing, having a transmitter for modulating a plurality of carriers with a plurality of signals to transmit the signals having a transmission band, and a receiver for receiving and demodulating said signals,

wherein said transmitter comprises:

a first error correction coding circuit for converting a first code to a first error correction code;

a second error correction coding circuit for converting a second code to a second error correction code which has error correcting performance higher than said first error correction code;

a first modulator for outputting first signals which are main information code signals modulated with said first error correction code in accordance with a first modulation scheme;

a second modulator for outputting signals which are auxiliary signals modulated with said second error correction code in accordance with a second modulation scheme; and

a distributing circuit for distributing said first and second signals modulated by said first and second modulators to a plurality of predetermined

carriers, respectively, so that said second signals are arranged at the positions of all or some of said plurality of predetermined carriers existing within a limited number of carriers close to at least one of both lower and upper ends of said transmission band, and said first signals are arranged at the positions of all or some of the remaining carriers other than said limited number of carriers of said transmission band.

13. (previously presented) An apparatus according to claim 1, wherein said first modulation scheme is a synchronous modulation scheme and said second modulation scheme is a differential modulation scheme.

14. (previously presented) An apparatus according to claim 13, wherein said second modulation scheme is one of DBPSK, DQPSK, 8DPSK and 16DAPSK schemes.

15. (previously presented) An apparatus according to claim 1, wherein said second modulation scheme in said second modulator is a modulation scheme having a smaller number of multilevel than a number of multilevel in said first modulation scheme in said first modulator which can be applied with the synchronous detection.

16. (previously presented) An apparatus according to claim 15, wherein said second modulation scheme in said second modulator is one of QPSK, 16QAM and 32QAM schemes.

17. (previously presented) An apparatus according to claim 16,
wherein said first modulation scheme in said first modulator is 64QAM.

18. (previously presented) An apparatus according to claim 6,
wherein said first modulation scheme in said first modulator is 64QAM.